that Prof. Campbell's party is equipped with a fine set of instruments, and that it is prepared to cover a wide field of research.

Although the above will be the only official expedition to the island, an enthusiastic amateur in the person of Mr. F. K. McClean is already wending his way there. Mr. McClean is the son of the late Mr. Frank McClean, F.R.S., who, it will be remembered, besides completing a valuable spectroscopic survey of the brighter stars in both hemispheres, made valuable endowments both to the Cape Observatory and the Cambridge University.

At the eclipse of 1905 Mr. F. K. McClean accompanied the Solar Physics Observatory's expedition to Majorca as volunteer assistant. On that occasion he was in charge of a large coronagraph of 16 feet focal length, which he manipulated successfully, so he is not a novice at eclipse work.

For the coming eclipse he is taking out a fine 22-inch siderostat, one coronagraph, and a small grating spectrograph. The coronagraph consists of a 4⅝-inch De la Rue objective of 8 feet focal length, which has been used on numerous occasions during eclipses by the Solar Physics Observatory expeditions.

The optical parts of the grating spectrograph consist of a 4-inch Voigtländer of 42 inches focal length, and a Thorp's transparent replica of a Rowland diffraction grating having 14,500 lines to the inch and a ruled surface of 3 x 2 inches. In the eclipse of 1905 this instrument gave such satisfactory results that Mr. McClean wished to employ it again under, it is hoped, better weather conditions.

Mr. McClean has so arranged his programme that, failing any assistance at the station, he can make exposures in both the instruments. There is little doubt, however, that Prof. Campbell will be able to render him help should he require it.

It may be mentioned that if the *Annapolis* had been able to accommodate more than twelve of the eclipse party Mr. McClean would have been invited to join the Lick expedition. To reach Flint Island he has therefore gone to Auckland *viâ* Australia, and has chartered a special steamer to take him and his equipment to the island and back. From later information I find that, by arrangement with Prof. Campbell, he will pick up at Tahiti Mr. C. J. Mersfield, of the Royal Society of Sydney, and Mr. Moors, of the Sydney University, both of whom have volunteered to act as Prof. Campbell's assistants, and will convey them to Flint Island and back to Tahiti.

Let us hope that eclipse day will be fine, and that all will return with results which will add to our knowledge of the sun.

A cablegram, dated November 25, from Mr. McClean, at Auckland, states that Mr. Mersfield has joined him and will be attached to the Lick party. He further informs me that Mr. Raymond, of the Sydney Observatory, and Mr. Short, photographer to that observatory, together with the Rev. Mr. Walker, an amateur astronomer at Auckland, are going out with him and will form his party.

WILLIAM J. S. LOCKYER.

NEW AEROPLANES.

AN account of the successful aëroplane flights by which Mr. Henry Farman has succeeded in breaking the record hitherto held by M. Santos Dumont (in the absence of trustworthy information concerning the experiments of the Wright brothers) has probably been seen by most readers of NATURE in the daily papers. We are indebted to an article by M. René Doncière in *La Nature* for the further details regarding the machine and its performances which form the subject of the present notice.

Mr. Farman's machine has been constructed in the works of Messrs. Voisin Brothers, and is of the well-known cellular form, as shown in the accompanying illustration. The front pair of planes measure 12 x 2 metres, the height between them being 2 metres. This pair is connected by a framework 4½ metres long with the rear pair of planes, which only measures 6 metres transversely. The vertical rudder is situated between the latter planes, while a horizontal rudder is fixed right in front of the machine. The motors and tanks of petrol are contained in a spindle-shaped case in front, into which is let the seat for the operator.

The motive power is furnished by an eight-cylinder "Antoinette" motor of 40–50 (metric) horse-power, and operates on a propeller the two vanes of which are 2·10 metres across and 1·10 metres in pitch. The whole apparatus rests on four wheels when on the ground. The total wing surface is 52 square metres and the weight 500 kilograms; the length of the machine is 10 metres. At present—or at any rate at the time of M. Doncière's account—the machine has a tendency to take an upward direction on leaving the ground, but while this prevented Mr. Farman from making extended trips, he has nevertheless succeeded in covering 771 to 800 metres at a height of 6 metres above the ground. These records, performed on and after October 26, following after flights of 303 and 350 metres, represented the maximum course obtainable within the limits of the field on which the experiments were made.

In regard to what the average Englishman would call the "practical" aspect of these experiments with reference to the possibilities of aëroplane machines coming into general use, reference is made to the great skill needed in controlling the machine. The operator has to manipulate or observe at the same moment the vertical and the horizontal rudder, the carburettor, the sparking, the pressure gauges of the petrol and water, to listen to the throbbing of the motor, to balance the machine laterally, taking account of the effects of wind, and finally to avoid coming into collision with the crowd of spectators.

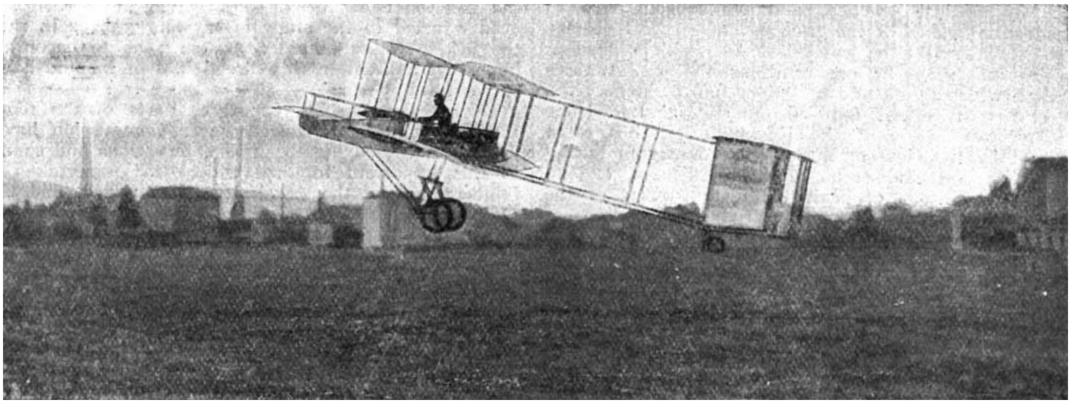
Later news states that Mr. Farman has again made several attempts to win the Deutsch Archdeacon prize, but has failed to do so owing to the wheels of his machine grazing the ground, especially in the neighbourhood of the turning points.

Another aëroplane which is also attracting considerable attention at Paris is the "monoplane" of M. Robert Esnault Pelterie. This, unlike most recent types, has only a single transverse supporting surface, which in one machine measured 9·6 metres from tip to tip with a superficial area of 18 square metres; in a more recent machine these dimensions have been reduced to 8·6 metres and 16 square metres respectively. The surface is somewhat concave in form. In addition there is a single horizontal rudder placed at the rear, while the motor and propeller are in the front of the machine. The motor consists of seven cylinders arranged round a circle, and it gives 25 to 30 horse-power with a weight of 44 kilograms. The total weight of the machine and its rider amount to 240 kilograms. For running along the ground the monoplane has two wheels, arranged bicycle-fashion, attached to the body, and two other wheels are attached to the tips of the wings. The recorded performances, which commenced on October 22, include straight flights of about 100 metres and 147 metres, and a path stated to be a semicircle of radius about 1640 feet, which, if correct, represents a flight of, roughly, 1600 metres. But at the end of the flight of 147

© 1907 Nature Publishing Group

metres the machine fell vertically on the ground, and was damaged.

An aeroplane constructed on the other side of the Atlantic is described in the *Scientific American* for November 16 as "a heavier than air flying machine which lacks the faults of former similar devices according to its inventor, J. W. Roshon, of Harrisburg, Pa. . . ." This machine, which has not yet been tried, is characterised by its complexity to much the same extent that the monoplane is characterised by its simplicity. It has three principal supporting planes, the bottom and middle plane measuring 24 feet transversely by 8 feet longitudinally, while the top plane has only a transverse measurement of 12 feet. Between these three planes, which are placed one above the other, giving a total height of 17 feet, there are 26 narrow flat planes placed transversely at the front and rear of the larger planes. The total wing surface is 900 square feet, say 80 square metres, and the weight with an operator is estimated at 600lb., say 270 kilograms. To launch this large machine into the air an inclined plane has been specially constructed curving up at the bottom in order to start the machine with its rider skyward, but for the first test a bag of sand is to take the place of the latter.



Mr. Farman's aeroplane in full flight. From *La Nature.*

A further departure from the present fashion of machine is the gyroplane of Messrs. Breguet, which revives interest in the attempt to overcome gravity by vertical screw propellers. As at present designed, it is supported by four propellers placed at the corners of a square, each propeller having four revolving vanes, and each vane carrying a pair of superposed planes. The machine, which with its operator would weigh 540 kilograms, was found to hover successfully in the air at a height of a few feet for a minute, this representing the limit of the experiment, and the machine being held down to prevent any accident. It is thus claimed that aerial navigation by vertical screws is possible.

It is interesting to record the fact that the *Scientific American* estimates Mr. Farman's longest flight on October 26 as 2529·52 feet, and his longest measured flight on November 7 as 2624·66 feet. The French records are 771 and 800 metres respectively. Thus, by the use of English units, the American correspondent would appear to claim, if the results are correct, to have estimated these long-distance flights to within an eighth of an inch. But unless the figures represent the results of actual exact measurements (and of this no evidence is given), their accuracy cannot be admitted.

ANNIVERSARY MEETING OF THE ROYAL SOCIETY.

THE anniversary meeting of the Royal Society was held on Saturday, November 30, St. Andrew's Day. Lord Rayleigh, the president, was in the chair. Among the subjects referred to in the report of the council are the publication of the National Antarctic Expedition results, the International Catalogue of Scientific Literature, Royal Society's Catalogue of Scientific Papers, International Association of Academies, sleeping sickness, and Malta fever. The following statement, drawn up by the council, was presented to the Royal Commission on Vivisection in March last:—

The Royal Society, from its age and the position accorded to it among scientific institutions, feels its responsibility as a guardian of the general interests of science in this country. Founded as it was for the promotion of natural knowledge, whenever from time to time legislative changes have been proposed which might seem likely to affect the advancement of that knowledge, the society has desired to make its voice heard on behalf of scientific progress. The recent appointment of a Royal Commission on the subject of experiments on animals has been deemed by the president and council of the Royal Society to be an occasion when they may ask to be allowed to lay before that Commission a statement of their views on the broad scientific bearings of the question.

There can be no doubt that the main cause of the remarkable development of science in modern times has been the adoption of the experimental method of investigating nature. In every department of research this method has led to the most important advances, both in questions of theory and in practical applications to the useful purposes of life. From the beginning of its history the Royal Society has fostered the prosecution of experiment, not only in physical and chemical, but in biological inquiry, and its publications are full of records of the discoveries which have consequently been made.

In no branches of investigation have the theoretical and practical successes of experimental work been more conspicuous in recent years than in physiology and its practical applications in medicine and surgery. In medicine, the careful and patient testing of the effects of drugs on the lower animals has not only led to an accurate knowledge, not otherwise attainable, of these effects as produced on the human body, but has greatly increased the number of substances now available to the physician in the treatment of disease. Without this method of investigation the progress of pharmacology, in recent years so astonishing and beneficent, would be arrested, and diseases, which may in time be successfully combated, would continue their ravages unchecked. In modern surgery the application of similar experimental work has been attended

© 1907 Nature Publishing Group